

THE INVENTION CLAIMED IS

1. A method of manufacturing an actuator for acting upon a material in a vessel, comprising the steps of:

processing a shape memory polymer material so that it will expand into a somewhat umbrella shape upon being activated, and  
operatively connecting said shape memory polymer material to an optical fiber.

2. The method of manufacturing an actuator for acting upon a material in a vessel of claim 1 wherein said step of processing a shape memory polymer material so that it will expand into a somewhat umbrella shape upon being activated, includes, heating said shape memory polymer material above its melting temperature during processing.

3. The method of manufacturing an actuator for acting upon a material in a vessel of claim 1 wherein said shape memory polymer material has a primary shape before being activated and said step of processing a shape memory polymer material so that it will expand into a somewhat umbrella shape upon being activated, includes, polymerizing said shape memory polymer material while in its primary shape.

4. The method of manufacturing an actuator for acting upon a material in a vessel of claim 2 wherein said shape memory polymer material possesses a glass transformation temperature ( $T_g$ ) above which the material enters a reversible glassy phase where it becomes soft and flexible and easy to reshape the material and will return to its primary shape if not subjected to undue pressure and once cooled below  $T_g$ , the shape is frozen in place and the material

becomes hardened and will hold its shape until it is intentionally relaxed by heating the SMP above  $T_g$  again.